DRINKING WATER SURVEILLANCE PROGRAM

TILBURY WATER TREATMENT PLANT

ANNUAL REPORT 1990

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TILBURY
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

TILBURY WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 supplies were being monitored.

The Tilbury water treatment plant is a conventional treatment plant which treats water from Lake St. Clair. The process consists of coagulation, flocculation, clarification, (upflow clarifier), filtration (using pressure filters), taste and odour control, fluoridation and disinfection. Polyphosphate is added for corrosion control. This plant has a rated capacity of 6.519 x 1000 m^3/day. The Tilbury water treatment plant serves a population of approximately 2,000.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Tilbury water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

The persistent finding of atrazine, its metabolites, and traces of other pesticides, indicated a raw water source impacted by agricultural activity.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE

A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE
BACTERIOLOGICAL	24	20	83	8	0	0	6	5	83
CHEMISTRY (FLD)	24	24	100	42	42	100	75	73	97
CHEMISTRY (LAB)	176	165	93	176	144	81	285	253	88
METALS	192	99	51	192	70	36	299	151	50
CHLOROAROMATICS	112	0	0	98	0	0	112	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.
PAH	117	0	0	118	0	0	17	0	0
PESTICIDES & PCB	273	5	1	251	2	0	171	1	0
PHENOLICS	8	0	0	8	4	50	.	.	.
SPECIFIC PESTICIDES	60	1	1	59	1	1	8	0	0
VOLATILES	232	0	0	232	32	13	232	32	13
TOTAL	1230	314		1196	295		1205	515	

DRINKING WATER SURVEILLANCE PROGRAM

TILBURY WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Tilbury water treatment plant in the spring of 1990. This is the first published annual report.

PLANT DESCRIPTION

The Tilbury water treatment plant is a conventional treatment plant which treats water from Lake St. Clair. The process consists of coagulation, flocculation, clarification, (upflow clarifier), filtration using pressure filters, taste and odour control, fluoridation and disinfection. Polyphosphate is added for corrosion control. This plant has a rated capacity of 6.519 x 1000 m^3/day. The Tilbury water treatment plant serves a population of approximately 2,000.

The sample day flows ranged from 3.480 x 1000 m^3/day to 5.790 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of

the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 8 of 15 treated and distributed water samples with a maximum reported value of 23.0°C.

CHEMISTRY (LAB)

Calcium exceeded the European Economic Community (EEC) Aesthetic Guideline Level of 100 mg/L in 1 of 16 treated and distribution water samples with a maximum reported value of 113.0 mg/L.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 16 of 16 treated and distributed water samples with a maximum reported value of 371.0 mg/L.

Elevated conductivity is often associated with high hardness levels.

Conductivity exceeded the EEC Aesthetic Guideline Level of 400 umho/cm in 13 of 16 treated and distributed water samples with a maximum reported value of 753 umho/cm.

Total ammonium exceeded the EEC Aesthetic Guideline Level of 0.05 mg/L in 1 distribution water sample with a maximum reported value of 0.054 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 3 of 15 treated and distribution water samples with a maximum reported value of 120.0 ug/L.

ORGANIC

CHLOROAROMATICS

Hexachlorocyclopentadiene was found at positive levels in 2 of 5 treated and distribution water samples with a maximum reported value of 100.0 ng/L. The United States Environmental Protection Agency Ambient Water Quality Criteria for hexachlorocyclopentadiene is 206,000 ng/L.

The results of the other parameters in the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected in the treated and distributed water.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

Atrazine was found at a positive level in 1 of the 8 treated water samples. The maximum observed level was 530.0 ng/L. This was below the ODWO Interim Maximum Acceptable Concentration of 60,000 ng/L.

A comparison between the raw and treated atrazine results indicated that the treatment process reduced the levels of atrazine in the treated water.

The trace level occurrence of several pesticide scan parameters indicated a raw water source impacted by agricultural use.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

Carbaryl was the only specific pesticide found at a positive level. It was detected in 1 of the 2 treated water samples with a reported value of 2,200.0 ng/L. This was below the ODWO Maximum Acceptable Concentration of 90,000 ng/L.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 16 treated and distributed water samples analyzed with a maximum level of 130.7 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Tilbury water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

The persistent finding of atrazine, its metabolites, and traces of other pesticides indicated a raw water source impacted by agricultural activity.

Specific pesticides testing should be increased from twice per year, in order to monitor occurrence in source water.

FIGURE 1

TILBURY WATER TREATMENT PLANT

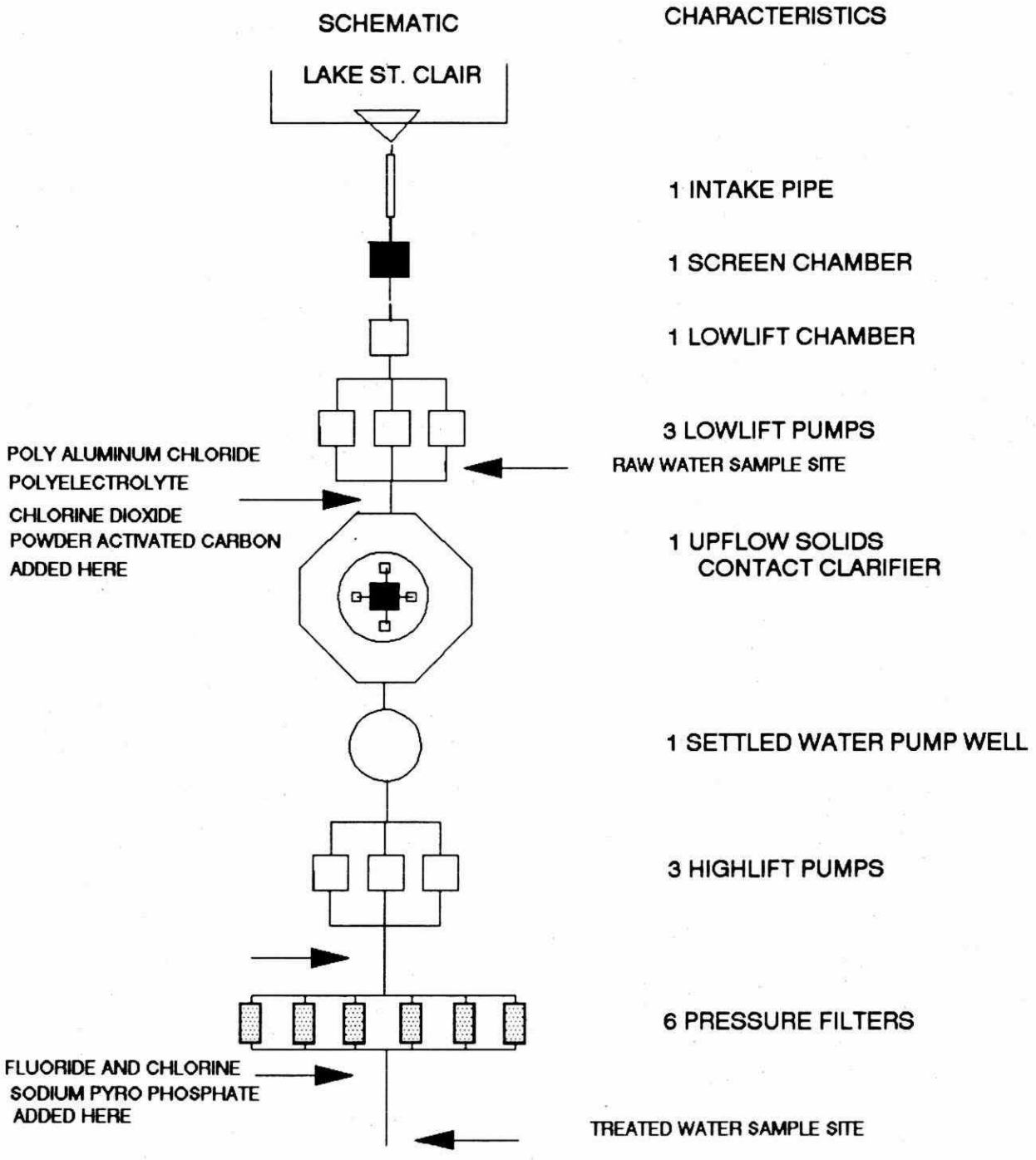

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220003350
PLANT NAME: TILBURY WATER TREATMENT PLANT

DISTRICT: WINDSOR
REGION: SOUTH WEST
DISTRICT OFFICER: MR. J. DRUMMOND

UTM #:

PLANT SUPERINTENDENT: MR. GUS BOUILLION

ADDRESS: P.O. BOX 179
STONEY POINT, ONTARIO
N0R 1N0
(Telephone)

MUNICIPALITY: TILBURY
AUTHORITY: PROVINCIAL

PLANT INFORMATION:

PLANT VOLUME:	0.000	**(x 1000 m3)**
DESIGN CAPACITY:	0.000	**(x 1000 m3/day)**
RATED CAPACITY:	6.519	**(x 1000 m3/day)**

MUNICIPALITY:	**POPULATION:**
TILBURY EAST TOWNSHIP	800
TILBURY NORTH TOWNSHIP	1,200

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
COMBINED CHLORINE RESIDUAL	TREATED WATER	
FREE CHLORINE RESIDUAL	TREATED WATER	
TOTAL CHLORINE RESIDUAL	TREATED WATER	
PH	RAW WATER TREATED WATER	EVERY 4 HOURS
TEMPERATURE	RAW WATER	
TURBIDITY	RAW WATER TREATED WATER	CONTINUOUS CONTINUOUS

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)				
			COAGULATION	POST CHLORINATION	FLUORIDATION	TASTE & ODOUR	CORROSION CONTROL
DATE	DELAY * TIME(HRS)	FLOW (1000M3)	POLY ALUMINUM CHLORIDE	CHLORINE	SODIUM FLUORIDE	ACTIVATED CARBON POWDER	SODIUM POLYPHOSPHATE
MAY 22	.00	.000	22.00	5.49	1.30	5.00	1.00
JUN 19	.50	4.390	13.50	3.87	.90	5.00	1.09
JUL 17	7.15	3.970	18.40	6.05	1.00	5.00	.89
AUG 22	8.20	3.480	14.60	5.60	1.25	5.00	1.03
SEP 18	5.00	5.790	38.40	6.77	1.40	5.00	1.00
OCT 16	5.31	3.510	28.83	6.55	1.10	5.06	.84
NOV 14	8.00	3.630	42.21	4.63	1.30	6.40	1.50
DEC 18	6.20	4.570	20.03	3.96	1.10	4.10	.94

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL									
FECAL COLIFORM MF	8	8	0	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	8	0	0	6	5	0
TOTAL COLIFORM MF	8	4	0	.	.	.	.	.	.
T COLIFORM BCKGRD MF	8	8	0	.	.	.	.	.	.
*TOTAL SCAN BACTERIOLOGICAL	24	20	0	8	0	0	6	5	0
CHEMISTRY (FLD)									
FLD CHLORINE (COMB)	.	.	.	7	7	0	15	15	0
FLD CHLORINE FREE	.	.	.	7	7	0	15	13	0
FLD CHLORINE (TOTAL)	.	.	.	7	7	0	15	15	0
FLD PH	8	8	0	7	7	0	15	15	0
FLD TEMPERATURE	8	8	0	7	7	0	15	15	0
FLD TURBIDITY	8	8	0	7	7	0	.	.	.
*TOTAL SCAN CHEMISTRY (FLD)	24	24	0	42	42	0	75	73	0
CHEMISTRY (LAB)									
ALKALINITY	8	8	0	8	8	0	15	15	0
CALCIUM	8	8	0	8	8	0	15	15	0
CYANIDE	8	0	0	8	0	0	.	.	.
CHLORIDE	8	8	0	8	8	0	15	15	0
COLOUR	8	8	0	8	1	7	15	6	7
CONDUCTIVITY	8	8	0	8	8	0	15	15	0
DISS ORG CARBON	8	8	0	8	8	0	15	15	0
FLUORIDE	8	8	0	8	8	0	15	15	0
HARDNESS	8	8	0	8	8	0	15	15	0
IONCAL	8	8	0	8	8	0	15	15	0
LANGELIERS INDEX	8	8	0	8	8	0	15	15	0
MAGNESIUM	8	8	0	8	8	0	15	15	0
SODIUM	8	8	0	8	8	0	15	15	0
AMMONIUM TOTAL	8	6	0	8	0	1	15	3	7
NITRITE	8	8	0	8	0	5	15	4	8
TOTAL NITRATES	8	8	0	8	8	0	15	15	0
NITROGEN TOT KJELD	8	8	0	8	8	0	15	15	0
PH	8	8	0	8	8	0	15	15	0
PHOSPHORUS FIL REACT	8	7	1	8	8	0	.	.	.
PHOSPHORUS TOTAL	8	8	0	8	8	0	.	.	.
SULPHATE	8	8	0	8	8	0	15	15	0
TURBIDITY	8	8	0	8	7	1	15	15	0
*TOTAL SCAN CHEMISTRY (LAB)	176	165	1	176	144	14	285	253	22

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS									
SILVER	8	0	0	8	0	1	13	0	0
ALUMINUM	8	8	0	8	8	0	13	13	0
ARSENIC	8	3	5	8	0	6	13	0	13
BARIUM	8	8	0	8	8	0	13	13	0
BORON	8	8	0	8	8	0	13	13	0
BERYLLIUM	8	0	5	8	0	0	13	0	0
CADMIUM	8	0	5	8	0	2	13	0	3
COBALT	8	2	6	8	0	7	13	0	13
CHROMIUM	8	0	8	8	0	6	13	0	11
COPPER	8	1	7	8	0	8	13	10	3
IRON	8	8	0	8	0	3	13	0	11
MERCURY	8	0	0	8	1	0	.	.	.
MANGANESE	8	8	0	8	5	3	13	13	0
MOLYBDENUM	8	6	2	8	8	0	13	13	0
NICKEL	8	2	5	8	1	4	13	5	6
LEAD	8	6	2	8	0	3	13	12	1
ANTIMONY	8	0	8	8	5	3	13	7	6
SELENIUM	8	0	4	8	0	7	13	0	9
STRONTIUM	8	8	0	8	8	0	13	13	0
TITANIUM	8	8	0	8	6	2	13	11	2
THALLIUM	8	0	0	8	0	0	13	0	0
URANIUM	8	7	1	8	4	4	13	7	6
VANADIUM	8	8	0	8	6	2	13	9	4
ZINC	8	8	0	8	2	6	13	12	1
*TOTAL SCAN METALS	192	99	58	192	70	67	299	151	89
*TOTAL GROUP INORGANIC & PHYSICAL	392	288	59	410	256	81	659	477	111
CHLOROAROMATICS									
HEXACHLOROBUTADIENE	8	0	0	7	0	0	8	0	0
123 TRICHLOROBENZENE	8	0	0	7	0	0	8	0	0
1234 T-CHLOROBENZENE	8	0	0	7	0	0	8	0	0
1235 T-CHLOROBENZENE	8	0	0	7	0	0	8	0	0
124 TRICHLOROBENZENE	8	0	0	7	0	0	8	0	0
1245 T-CHLOROBENZENE	8	0	0	7	0	0	8	0	0
135 TRICHLOROBENZENE	8	0	0	7	0	0	8	0	0
HCB	8	0	0	7	0	0	8	0	0
HEXACHLOROETHANE	8	0	0	7	0	0	8	0	1
OCTACHLOROSTYRENE	8	0	0	7	0	0	8	0	0
PENTACHLOROBENZENE	8	0	0	7	0	0	8	0	0
236 TRICHLOROTOLUENE	8	0	0	7	0	0	8	0	0
245 TRICHLOROTOLUENE	8	0	0	7	0	0	8	0	0
26A TRICHLOROTOLUENE	8	0	0	7	0	0	8	0	0
*TOTAL SCAN CHLOROAROMATICS	112	0	0	98	0	0	112	0	1

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROPHENOLS									
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0
PAH									
PHENANTHRENE	7	0	0	7	0	0	1	0	0
ANTHRACENE	7	0	0	7	0	0	1	0	0
FLUORANTHENE	7	0	0	7	0	0	1	0	0
PYRENE	7	0	0	7	0	0	1	0	0
BENZO(A)ANTHRACENE	7	0	0	7	0	0	1	0	0
CHRYSENE	7	0	0	7	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	7	0	0	7	0	0	1	0	0
BENZO(E) PYRENE	7	0	0	7	0	0	1	0	0
BENZO(B) FLUORANTHEN	7	0	1	7	0	0	1	0	0
PERYLENE	6	0	0	7	0	0	1	0	0
BENZO(K) FLUORANTHEN	7	0	2	7	0	0	1	0	0
BENZO(A) PYRENE	6	0	1	6	0	0	1	0	0
BENZO(G,H,I) PERYLEN	7	0	0	7	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	7	0	0	7	0	0	1	0	0
INDENO(1,2,3-C,D) PY	7	0	0	7	0	0	1	0	0
BENZO(B) CHRYSENE	7	0	0	7	0	0	1	0	0
CORONENE	7	0	1	7	0	0	1	0	0
*TOTAL SCAN PAH	117	0	5	118	0	0	17	0	0
PESTICIDES & PCB									
ALDRIN	8	0	0	7	0	0	8	0	0
ALPHA BHC	8	0	2	7	0	0	8	0	0
BETA BHC	8	0	0	7	0	0	8	0	0
LINDANE	8	0	4	7	0	0	8	0	1
ALPHA CHLORDANE	8	0	0	7	0	0	8	0	0
GAMMA CHLORDANE	8	0	0	7	0	0	8	0	0
DIELDRIN	8	0	0	7	0	0	8	0	0
METHOXYCHLOR	8	0	0	7	0	0	8	0	0
ENDOSULFAN 1	8	0	0	7	0	0	8	0	0
ENDOSULFAN II	8	0	0	7	0	0	8	0	0
ENDRIN	8	0	0	7	0	0	8	0	0
ENDOSULFAN SULPHATE	8	0	0	7	0	0	8	0	0
HEPTACHLOR EPOXIDE	8	0	0	7	0	0	8	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
HEPTACHLOR	8	0	0	7	0	0	8	0	0
MIREX	8	0	0	7	0	0	8	0	0
OXYCHLORDANE	8	0	0	7	0	0	8	0	0
OPDDT	8	0	0	7	0	0	8	0	0
PCB	8	0	0	7	0	0	8	0	0
DDD	8	0	0	7	0	0	8	0	0
PPDDE	8	0	0	7	0	0	8	0	0
PPDDT	8	0	0	7	0	0	8	0	0
AMETRINE	8	0	0	8	0	0	.	.	.
ATRAZINE	8	5	2	8	1	6	.	.	.
ATRATONE	8	0	0	8	0	0	.	.	.
CYANAZINE (BLADEX)	8	0	1	8	0	1	.	.	.
DESETHYLATRAZINE	8	0	2	8	0	0	.	.	.
D-ETHYL SIMAZINE	6	0	0	6	0	0	.	.	.
PROMETONE	8	0	0	8	0	0	.	.	.
PROPAZINE	8	0	0	8	0	0	.	.	.
PROMETRYNE	8	0	0	8	0	0	.	.	.
METRIBUZIN (SENCOR)	8	0	0	8	0	0	.	.	.
SIMAZINE	8	0	0	8	0	0	.	.	.
ALACHLOR (LASSO)	8	0	0	8	0	0	.	.	.
METOLACHLOR	8	0	3	8	0	2	.	.	.
HEXACLCYCLOPENTADIEN	3	0	0	2	1	0	3	1	0
*TOTAL SCAN PESTICIDES & PCB	273	5	14	251	2	9	171	1	1
PHENOLICS									
PHENOLICS	8	0	3	8	4	2	.	.	.
*TOTAL SCAN PHENOLICS	8	0	3	8	4	2	0	0	0
SPECIFIC PESTICIDES									
TOXAPHENE	8	0	0	7	0	0	8	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.
ETHION	2	0	0	2	0	0	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PHORATE	2	0	0	2	0	0	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.
BUX	0	0	0	0	0	0	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.
CICP	2	0	0	2	0	0	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.
EPTAM	2	0	0	2	0	0	.	.	.
IPC	2	0	0	2	0	0	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.
CARBARYL	2	1	0	2	1	0	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	60	1	0	59	1	0	8	0	0
VOLATILES									
BENZENE	8	0	0	8	0	0	8	0	0
TOLUENE	8	0	1	8	0	2	8	0	3
ETHYLBENZENE	8	0	1	8	0	6	8	0	7
P-XYLENE	8	0	0	8	0	0	8	0	0
M-XYLENE	8	0	0	8	0	0	8	0	2
O-XYLENE	8	0	0	8	0	0	8	0	2
STYRENE	8	0	1	8	0	0	8	0	0
1,1 DICHLOROETHYLENE	8	0	0	8	0	0	8	0	0
METHYLENE CHLORIDE	8	0	0	8	0	0	8	0	0
T1,2DICHLOROETHYLENE	8	0	0	8	0	0	8	0	0
1,1 DICHLOROETHANE	8	0	0	8	0	0	8	0	0
CHLOROFORM	8	0	0	8	8	0	8	8	0
111, TRICHLOROETHANE	8	0	0	8	0	0	8	0	0
1,2 DICHLOROETHANE	8	0	0	8	0	0	8	0	0
CARBON TETRACHLORIDE	8	0	0	8	0	0	8	0	0
1,2 DICHLOROPROPANE	8	0	0	8	0	0	8	0	0
TRICHLOROETHYLENE	8	0	0	8	0	0	8	0	0
DICHLOROBROMOMETHANE	8	0	0	8	8	0	8	8	0
112 TRICHLOROETHANE	8	0	0	8	0	0	8	0	0
CHLORODIBROMOMETHANE	8	0	0	8	8	0	8	8	0
T-CHLOROETHYLENE	8	0	0	8	0	2	8	0	2
BROMOFORM	8	0	0	8	0	2	8	0	3
1122 T-CHLOROETHANE	8	0	0	8	0	0	8	0	0
CHLOROBENZENE	8	0	0	8	0	0	8	0	0
1,4 DICHLOROBENZENE	8	0	0	8	0	0	8	0	0
1,3 DICHLOROBENZENE	8	0	0	8	0	0	8	0	0
1,2 DICHLOROBENZENE	8	0	0	8	0	0	8	0	0
ETHLYENE DIBROMIDE	8	0	0	8	0	0	8	0	0
TOTL TRIHALOMETHANES	8	0	0	8	8	0	8	8	0
*TOTAL SCAN VOLATILES	232	0	3	232	32	12	232	32	19
*TOTAL GROUP ORGANIC	814	6	25	778	39	23	540	33	21

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIN		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(TO6)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
BACTERIOLOGICAL				
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)
MAY	4	.	.	.
JUN	4	.	.	.
JUL	2	.	.	.
AUG	4	.	.	.
SEP	550	.	.	.
OCT	440	.	.	.
NOV	130	.	.	.
DEC	12	.	.	.
STANDRD PLATE CNT MF (COUNT/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)
MAY	.	3 <=>	.	.
JUN	.	0 <=>	.	.
JUL	.	1 <=>	.	13
AUG	.	4 <=>	.	48
SEP	.	1 <=>	.	52
OCT	.	9 <=>	.	74
NOV	.	2 <=>	.	29
DEC	.	6 <=>	.	1 <=>
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)
MAY	30 <=>	.	.	.
JUN	40 <=>	.	.	.
JUL	100 <=>	.	.	.
AUG	200 <=>	.	.	.
SEP	10300	.	.	.
OCT	10000	.	.	.
NOV	2600	.	.	.
DEC	1300	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A
MAY	9100	.	.	.
JUN	48000 >	.	.	.
JUL	54000	.	.	.
AUG	36000	.	.	.
SEP	30000	.	.	.
OCT	40000	.	.	.
NOV	80000	.	.	.
DEC	8700	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (FLD)				
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
MAY	.	.	.	.400
JUN	.	.360	.010	.400
JUL	.	.740	1.100	.300
AUG	.	1.080	.400	.300
SEP	.	.810	.400	.200
OCT	.	.380	.200	.400
NOV	.	.420	.400	.400
DEC	.	.300	.200	.200
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
MAY	.	.	.	.700
JUN	.	1.240	.000	.700
JUL	.	1.660	.000	1.000
AUG	.	2.180	.700	.900
SEP	.	2.830	.500	.300
OCT	.	2.500	.500	.500
NOV	.	2.600	1.300	1.300
DEC	.	2.380	.900	1.100
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
MAY	.	.	.	1.100
JUN	.	1.600	.010	1.100
JUL	.	2.400	1.100	1.300
AUG	.	3.260	1.100	1.200
SEP	.	3.640	.900	.500
OCT	.	2.880	.700	.900
NOV	.	3.020	1.700	1.700
DEC	.	2.680	1.100	1.300
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)
MAY	7.000	.	.	7.600
JUN	7.100	7.300	7.400	7.400
JUL	7.100	7.000	7.600	7.600
AUG	7.000	6.800	7.600	7.700
SEP	7.000	6.500	7.300	7.200
OCT	7.600	7.200	7.400	7.400
NOV	7.500	7.100	7.500	7.400
DEC	7.100	7.000	7.600	7.600
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
MAY	14.500	.	.	13.000
JUN	22.000	22.000	20.000	18.000
JUL	23.000	23.000	19.000	19.000
AUG	21.000	21.000	20.100	20.100
SEP	16.000	17.000	19.000	17.500
OCT	12.000	12.000	17.000	14.500
NOV	3.000	3.000	15.000	9.900
DEC	3.000	3.000	10.000	8.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1	(A1)
MAY	21.000	.	.	.	
JUN	10.000	.200	.	.	
JUL	50.000	.150	.	.	
AUG	20.000	.200	.	.	
SEP	110.000	.500	.	.	
OCT	100.000	.400	.	.	
NOV	90.000	.340	.	.	
DEC	26.000	.140	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (LAB)				
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A3)
MAY	141.600	123.000	.	125.500
JUN	146.400	128.600	106.800	105.100
JUL	121.900	107.600	89.400	90.700
AUG	101.200	93.400	100.600	102.700
SEP	138.000	113.700	114.400	114.300
OCT	221.700	187.000	165.700	162.000
NOV	144.400	148.700	159.500	158.300
DEC	271.600	259.700	220.200	231.300
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)
MAY	64.000	61.800	.	70.800
JUN	62.000	60.600	47.200	45.500
JUL	51.400	50.700	40.200	42.500
AUG	35.800	39.200	44.400	47.000
SEP	55.000	53.800	58.200	57.200
OCT	95.300	86.700	78.600	80.100
NOV	54.600	69.000	70.000	68.400
DEC	114.000	113.000	94.600	98.000
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)
MAY	26.500	35.300	.	41.500
JUN	35.100	42.500	29.600	27.500
JUL	26.800	36.200	27.400	26.800
AUG	21.800	32.000	38.000	39.000
SEP	24.200	40.700	41.100	40.800
OCT	28.100	41.200	45.800	44.400
NOV	16.700	36.500	35.700	40.300
DEC	38.200	46.700	44.200	44.800
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)
MAY	8.500	1.000 <T	.	3.500
JUN	8.500	1.500 <T	BDL	BDL
JUL	10.000	.500 <T	1.000 <T	1.000 <T
AUG	5.500	.500 <T	1.000 <T	1.000 <T
SEP	16.000	2.000 <T	4.500	4.000
OCT	21.500	3.500	3.000	3.000
NOV	9.000	1.000 <T	9.000	2.000 <T
DEC	9.000	2.000 <T	1.500 <T	1.500 <T
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)
MAY	483	485	.	525
JUN	504	497	390	375
JUL	417	430	367	369
AUG	327	366	412	422
SEP	415	438	451	451
OCT	606	613	589	585
NOV	403	514	536	531
DEC	724	753	670	690

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)
MAY	3.600	2.700	.	3.400
JUN	3.900	3.300	2.100	2.200
JUL	3.800	2.700	3.000	2.400
AUG	3.100	2.300	2.800	2.600
SEP	4.900	3.100	3.500	3.500
OCT	5.600	2.200	.800	.700
NOV	3.100	2.300	2.800	3.000
DEC	3.800	2.900	3.100	3.100
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)
MAY	.160	1.140	.	1.020
JUN	.160	1.240	1.100	1.100
JUL	.200	1.320	1.120	1.100
AUG	.140	1.100	1.060	1.040
SEP	.160	1.100	.900	.900
OCT	.140	1.140	1.060	1.040
NOV	.120	1.080	1.060	1.060
DEC	.140	1.140	1.180	1.220
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)
MAY	160.000	217.000	.	234.000
JUN	214.000	211.000	166.300	160.000
JUL	178.900	174.900	146.800	152.500
AUG	135.000	145.000	160.000	168.000
SEP	196.000	190.000	193.000	190.000
OCT	311.000	288.000	265.000	267.000
NOV	185.000	226.000	234.000	232.000
DEC	375.000	371.000	314.000	325.000
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A
MAY	.105	1.698	.	3.114
JUN	2.928	.157	2.121	2.851
JUL	1.904	1.529	2.333	4.138
AUG	.334	1.027	.110	1.895
SEP	1.136	1.379	.099	.733
OCT	3.581	3.131	1.824	4.757
NOV	1.396	.965	.758	3.746
DEC	3.097	2.179	1.782	1.969
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A
MAY	.788	.611	.	.415
JUN	.877	.611	.472	.431
JUL	.584	.333	.328	.368
AUG	.395	.316	.448	.470
SEP	.678	.122	.477	.429
OCT	1.224	1.008	.855	.874
NOV	.835	.989	.793	.911
DEC	1.343	1.219	1.014	1.090

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1	GUIDELINE = 30 (F2)
MAY	15.400	15.300	.	13.800
JUN	14.500	14.400	11.750	11.300
JUL	12.250	11.750	11.250	11.300
AUG	11.100	11.600	12.000	12.400
SEP	14.250	13.500	11.600	11.500
OCT	17.600	17.300	16.700	16.300
NOV	11.700	13.100	14.600	14.800
DEC	21.700	21.800	18.900	19.500
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)
MAY	9.600	11.800	.	14.600
JUN	15.900	18.700	13.100	12.500
JUL	15.100	16.400	15.000	14.400
AUG	12.200	14.600	17.200	17.800
SEP	9.200	12.800	14.200	14.200
OCT	11.700	14.400	15.900	16.500
NOV	7.800	11.000	12.600	12.800
DEC	17.600	18.800	16.400	16.600
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)
MAY	BDL	BDL	.	BDL
JUN	.042	BDL	.048	.054
JUL	.030	BDL	.078	.002 <T
AUG	.034	BDL	.004 <T	BDL
SEP	.014	BDL	BDL	.006 <T
OCT	BDL	.002 <T	BDL	.004 <T
NOV	.046	BDL	.006 <T	.002 <T
DEC	.076	BDL	.004 <T	BDL
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)
MAY	.098	.001 <T	.	.002 <T
JUN	.079	.001 <T	.008	.016
JUL	.080	BDL	.002 <T	BDL
AUG	.024	BDL	.001 <T	BDL
SEP	.094	.002 <T	.006	.005
OCT	.027	.002 <T	.001 <T	.003 <T
NOV	.042	.001 <T	.003 <T	BDL
DEC	.043	BDL	.002 <T	.001 <T
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)
MAY	5.500	5.700	.	6.700
JUN	4.510	4.400	2.420	2.050
JUL	3.830	3.810	2.150	2.390
AUG	.905	1.300	2.120	2.370
SEP	3.160	1.920	3.310	3.250
OCT	6.980	5.880	4.900	4.780
NOV	2.580	4.120	4.690	4.590
DEC	7.200	7.380	6.330	6.500

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
NITROGEN TOT KJELD (MG/L)			**DET'N LIMIT = 0.02**	**GUIDELINE = N/A**
MAY	.760	.330	.	.150
JUN	.780	.470	.310	.310
JUL	.630	.270	.700	.260
AUG	.360	.160	.300	.240
SEP	1.400	.350	.460	.470
OCT	.470	.470	.470	.480
NOV	.775	.280	.370	.300
DEC	.630	.390	.380	.360
PH (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = 6.5-8.5(A4)**
MAY	8.290	8.190	.	7.930
JUN	8.380	8.180	8.220	8.200
JUL	8.240	8.050	8.220	8.230
AUG	8.280	8.200	8.250	8.240
SEP	8.250	7.790	8.110	8.070
OCT	8.370	8.270	8.210	8.230
NOV	8.390	8.440	8.210	8.340
DEC	8.330	8.230	8.170	8.210
PHOSPHORUS FIL REACT (MG/L)			**DET'N LIMIT = 0.0005**	**GUIDELINE = N/A**
MAY	.002	.005	.	.
JUN	.004	.002	.	.
JUL	.020	.013	.	.
AUG	.001 <T	.007	.	.
SEP	.004	.002	.	.
OCT	.130	.143	.	.
NOV	.052	.242	.	.
DEC	.020	.095	.	.
PHOSPHORUS TOTAL (MG/L)			**DET'N LIMIT = 0.002**	**GUIDELINE = .40 (F2)**
MAY	.044	.013	.	.
JUN	.054	.015	.	.
JUL	.053	.021	.	.
AUG	.025	.013	.	.
SEP	.160	.033	.	.
OCT	.217	.325	.	.
NOV	.152	.340	.	.
DEC	.049	.335	.	.
SULPHATE (MG/L)			**DET'N LIMIT = .200**	**GUIDELINE = 500 (A3)**
MAY	43.800	43.850	.	47.350
JUN	42.630	44.680	32.230	29.790
JUL	32.940	33.740	38.110	37.960
AUG	25.940	31.040	34.610	35.530
SEP	33.610	35.320	37.900	37.610
OCT	36.370	41.420	44.490	45.570
NOV	26.080	31.410	36.120	36.140
DEC	46.910	49.910	48.690	48.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT			DISTRIBUTION SYSTEM		
	RAW	TREATED		SITE 1		
				STANDING	FREE FLOW	
TURBIDITY (FTU)				DET'N LIMIT = 0.05	GUIDELINE = 1	(A1)
MAY	22.000	.500		.	.610	
JUN	22.000	.560		1.220	.850	
JUL	20.000	.250	<T	.600	.350	
AUG	7.100	.450		.650	.550	
SEP	88.000	.560		1.100	.500	
OCT	200.000	> .460		.410	.570	
NOV	84.000	.600		.770	.520	
DEC	19.500	.290		1.120	1.120	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
METALS				
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	!SM	!SM
JUL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	.290 <T	BDL	BDL
DEC	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)
MAY	180.000	75.000	.	89.000
JUN	200.000	110.000	!SM	!SM
JUL	230.000	82.000	60.000	56.000
AUG	69.000	99.000	79.000	81.000
SEP	550.000	75.000	85.000	59.000
OCT	1100.000	78.000	53.000	75.000
NOV	530.000	120.000	67.000	77.000
DEC	180.000	56.000	51.000	120.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)
MAY	.800 <T	.480 <T	.	.250 <T
JUN	.510 <T	BDL	!SM	!SM
JUL	1.200	.430 <T	.320 <T	.710 <T
AUG	.880 <T	.360 <T	.410 <T	.430 <T
SEP	1.400	.760 <T	.590 <T	.570 <T
OCT	1.400	.620 <T	.470 <T	.610 <T
NOV	.940 <T	BDL	.190 <T	.130 <T
DEC	.740 <T	.390 <T	.420 <T	.200 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)
MAY	28.000	26.000	.	31.000
JUN	34.000	31.000	!SM	!SM
JUL	32.000	31.000	23.000	24.000
AUG	21.000	23.000	26.000	26.000
SEP	40.000	30.000	34.000	34.000
OCT	54.000	33.000	34.000	34.000
NOV	29.000	21.000	26.000	26.000
DEC	37.000	30.000	28.000	28.000
BORON (UG/L)			DET'N LIMIT = 2.0	GUIDELINE = 5000 (A1)
MAY	67.000	30.000	.	42.000
JUN	49.000	50.000	!SM	!SM
JUL	54.000	58.000	42.000	41.000
AUG	38.000	43.000	43.000	50.000
SEP	53.000	39.000	62.000	62.000
OCT	43.000	44.000	47.000	47.000
NOV	25.000	27.000	36.000	37.000
DEC	37.000	36.000	36.000	36.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)
MAY	.110 <T	BDL	.	BDL
JUN	BDL	BDL	!SM	!SM
JUL	.080 <T	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL
SEP	.090 <T	BDL	BDL	BDL
OCT	.110 <T	BDL	BDL	BDL
NOV	.060 <T	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
MAY	BDL	.070 <T	.	.110 <T
JUN	.070 <T	.090 <T	!SM	!SM
JUL	BDL	BDL	BDL	BDL
AUG	.060 <T	BDL	.060 <T	BDL
SEP	.080 <T	BDL	BDL	BDL
OCT	.130 <T	BDL	BDL	BDL
NOV	.100 <T	BDL	BDL	BDL
DEC	BDL	BDL	.060 <T	BDL
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A
MAY	.160 <T	.280 <T	.	.300 <T
JUN	.270 <T	.030 <T	!SM	!SM
JUL	.240 <T	.050 <T	.070 <T	.110 <T
AUG	.210 <T	.140 <T	.180 <T	.110 <T
SEP	1.100	.500 <T	.310 <T	.370 <T
OCT	1.800	.270 <T	.260 <T	.200 <T
NOV	.690 <T	.050 <T	.100 <T	.110 <T
DEC	.080 <T	BDL	.060 <T	.040 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)
MAY	3.800 <T	BDL	.	BDL
JUN	3.900 <T	3.400 <T	!SM	!SM
JUL	3.700 <T	3.700 <T	2.400 <T	2.700 <T
AUG	1.300 <T	1.100 <T	BDL	1.100 <T
SEP	4.300 <T	BDL	3.600 <T	3.600 <T
OCT	4.000 <T	1.700 <T	1.500 <T	.690 <T
NOV	2.700 <T	1.000 <T	2.100 <T	2.100 <T
DEC	3.500 <T	2.600 <T	3.200 <T	3.000 <T
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)
MAY	1.500 <T	1.400 <T	.	6.200
JUN	2.400 <T	1.400 <T	!SM	!SM
JUL	2.500 <T	1.000 <T	44.000	6.700
AUG	1.200 <T	1.000 <T	33.000	6.200
SEP	2.900 <T	1.300 <T	41.000	6.300
OCT	5.700	1.500 <T	22.000	4.600 <T
NOV	3.200 <T	1.100 <T	17.000	3.500 <T
DEC	1.600 <T	1.200 <T	130.000	3.100 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)
MAY	210.000	BDL	.	36.000 <T
JUN	300.000	BDL	!SM	!SM
JUL	340.000	BDL	34.000 <T	28.000 <T
AUG	130.000	BDL	20.000 <T	12.000 <T
SEP	110.000	10.000 <T	BDL	BDL
OCT	1800.000	13.000 <T	12.000 <T	19.000 <T
NOV	950.000	11.000 <T	13.000 <T	20.000 <T
DEC	290.000	BDL	6.100 <T	27.000 <T
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	.400	.	.
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)
MAY	14.000	.380 <T	.	3.500
JUN	22.000	.660	!SM	!SM
JUL	17.000	.370 <T	2.500	2.300
AUG	11.000	.360 <T	1.800	2.200
SEP	62.000	.650	3.700	2.800
OCT	130.000	.780	1.700	2.300
NOV	53.000	.710	1.300	1.900
DEC	16.000	1.100	1.100	2.800
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A
MAY	1.100	1.700	.	2.300
JUN	1.500	2.200	!SM	!SM
JUL	1.300	1.600	1.500	1.600
AUG	1.300	1.600	1.900	2.200
SEP	.600	1.600	2.900	2.600
OCT	.260 <T	1.700	2.000	2.400
NOV	.220 <T	.950	1.300	1.200
DEC	.750	1.100	1.300	1.300
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)
MAY	1.900 <T	.890 <T	.	2.100
JUN	BDL	BDL	!SM	!SM
JUL	1.300 <T	BDL	1.800 <T	.700 <T
AUG	1.100 <T	.920 <T	3.300	1.300 <T
SEP	4.000	2.100	2.700	3.000
OCT	4.300	.590 <T	.790 <T	.850 <T
NOV	1.500 <T	BDL	BDL	BDL
DEC	.400 <T	.590 <T	3.600	.520 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
LEAD (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 10. (A1)**
MAY	.530	BDL	.	.900
JUN	1.000	.140 <T	!SM	!SM
JUL	.700	BDL	2.000	.820
AUG	.310 <T	BDL	3.700	1.100
SEP	2.200	BDL	2.800	1.000
OCT	4.200	.070 <T	1.000	.620
NOV	2.400	.260 <T	.690	.260 <T
DEC	.360 <T	BDL	89.000	1.600
ANTIMONY (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 146 (D4)**
MAY	.210 <T	.530	.	.680
JUN	.410 <T	.520	!SM	!SM
JUL	.440 <T	.540	.750	.560
AUG	.370 <T	.520	.500 <T	.450 <T
SEP	.340 <T	.660	.610	.590
OCT	.220 <T	.470 <T	.500 <T	.440 <T
NOV	.270 <T	.440 <T	.540	.490 <T
DEC	.370 <T	.460 <T	.970	.470 <T
SELENIUM (UG/L)			**DET'N LIMIT = 1.00**	**GUIDELINE = 10 (A1)**
MAY	2.400 <T	1.400 <T	.	BDL
JUN	1.900 <T	2.500 <T	!SM	!SM
JUL	1.200 <T	1.100 <T	1.300 <T	2.100 <T
AUG	BDL	BDL	1.600 <T	BDL
SEP	2.200 <T	2.000 <T	4.000 <T	2.600 <T
OCT	BDL	1.100 <T	BDL	1.300 <T
NOV	BDL	1.100 <T	1.200 <T	BDL
DEC	BDL	1.100 <T	1.900 <T	1.300 <T
STRONTIUM (UG/L)			**DET'N LIMIT = 0.10**	**GUIDELINE = N/A**
MAY	220.000	220.000	.	290.000
JUN	330.000	320.000	!SM	!SM
JUL	410.000	380.000	290.000	300.000
AUG	240.000	270.000	310.000	320.000
SEP	260.000	260.000	280.000	280.000
OCT	350.000	330.000	350.000	350.000
NOV	180.000	190.000	240.000	250.000
DEC	450.000	440.000	350.000	370.000
TITANIUM (UG/L)			**DET'N LIMIT = 0.50**	**GUIDELINE = N/A**
MAY	12.000	11.000	.	13.000
JUN	12.000	7.400	!SM	!SM
JUL	8.800	4.600 <T	3.600 <T	3.800 <T
AUG	5.800	4.900 <T	6.000	5.900
SEP	15.000	9.200	11.000	12.000
OCT	16.000	12.000	10.000	11.000
NOV	10.000	25.000	17.000	18.000
DEC	13.000	15.000	13.000	16.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)
MAY	1.500	.930	.	1.200
JUN	1.200	1.100	!SM	!SM
JUL	.670	.490 <T	.480 <T	.440 <T
AUG	.470 <T	.390 <T	.470 <T	.490 <T
SEP	1.300	.270 <T	.570	.650
OCT	1.600	.560	.510	.520
NOV	.770	.190 <T	.390 <T	.400 <T
DEC	1.500	1.300	1.100	1.100
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A
MAY	.940	.510	.	.670
JUN	1.100	.570	!SM	!SM
JUL	1.500	1.200	1.100	1.200
AUG	.680	.570	.730	.720
SEP	2.500	.800	.980	.950
OCT	3.000	.580	.660	.660
NOV	1.700	.270 <T	.420 <T	.400 <T
DEC	.780	.270 <T	.480 <T	.350 <T
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)
MAY	3.000	1.500 <T	.	3.200
JUN	5.500	2.800	!SM	!SM
JUL	3.700	.980 <T	14.000	2.700
AUG	2.400	1.700 <T	23.000	6.000
SEP	8.700	1.300 <T	14.000	3.400
OCT	17.000	1.800 <T	11.000	7.000
NOV	11.000	2.500	13.000	4.500
DEC	3.400	.980 <T	190.000	1.700 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
CHLOROAROMATICS					
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)
MAY	BDL	BDL	.	BDL	
JUN	BDL	BDL	.	BDL	
JUL	BDL	BDL	.	BDL	
AUG	BDL	BDL	.	BDL	
SEP	BDL	BDL	.	BDL	
OCT	BDL	BDL	.	BDL	
NOV	BDL	BDL	.	BDL	
DEC	BDL	!PE	.	2.000 <T	
HEXACLCYCLOPENTADIEN (NG/L)			DET'N LIMIT = 5.0		GUIDELINE = 206000 (D4)
OCT	BDL	BDL	.	BDL	
NOV	BDL	60.000	.	100.000	
DEC	BDL	!PE	.	BDL	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PAH				
BENZO(B) FLUORANTHENE (NG/L)			DET'N LIMIT = 10.	GUIDELINE = N/A
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
AUG	!QU	!QU	.	.
SEP	BDL	BDL	.	.
OCT	12.000 <T	BDL	.	BDL
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.
BENZO(K) FLUORANTHENE (NG/L)			DET'N LIMIT = 1.	GUIDELINE = N/A
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
AUG	!QU	!QU	.	.
SEP	1.000 <T	BDL	.	.
OCT	3.000 <T	BDL	.	BDL
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.
BENZO(A) PYRENE (NG/L)			DET'N LIMIT = 5.	GUIDELINE = 10 (A1)
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
AUG	!QU	!QU	.	.
SEP	!QU	!QU	.	.
OCT	7.000 <T	BDL	.	BDL
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.
CORONENE (NG/L)			DET'N LIMIT = 10.	GUIDELINE = N/A
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
AUG	!QU	!QU	.	.
SEP	BDL	BDL	.	.
OCT	22.000 <T	BDL	.	BDL
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PESTICIDES & PCB				
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
AUG	1.000 <T	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	1.000 <T	BDL	.	BDL
DEC	BDL	!PE	.	BDL
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)
MAY	BDL	BDL	.	BDL
JUN	2.000 <T	BDL	.	BDL
JUL	2.000 <T	BDL	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	1.000 <T	BDL	.	BDL
NOV	BDL	BDL	.	3.000 <T
DEC	2.000 <T	!PE	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)
MAY	400.000 <T	200.000 <T	.	.
JUN	1250.000	530.000	.	.
JUL	2550.000	190.000 <T	.	.
AUG	390.000 <T	BDL	.	.
SEP	530.000	270.000 <T	.	.
OCT	730.000	140.000 <T	.	.
NOV	BDL	300.000 <T	.	.
DEC	520.000	200.000 <T	.	.
CYANAZINE (BLADEX) (NG/L)			DET'N LIMIT = 100	GUIDELINE = 10000 (A2)
MAY	BDL	BDL	.	.
JUN	200.000 <T	100.000 <T	.	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.
DESETHYLATRAZINE (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = 60000 (A2)
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	620.000 <T	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	400.000 <T	BDL	.	.
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
METOLACHLOR (NG/L)			DET'N LIMIT = 500.	GUIDELINE = 50000 (A2)
MAY	800.000 <T	500.000 <T	.	.
JUN	1800.000 <T	700.000 <T	.	.
JUL	600.000 <T	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PHENOLICS (UG/L	PHENOLICS)		DET'N LIMIT = .2	GUIDELINE = 2 (A4)
MAY	BDL	1.200	.	.
JUN	BDL	.400 <T	.	.
JUL	BDL	1.000	.	.
AUG	.800 <T	1.400	.	.
SEP	BDL	BDL	.	.
OCT	BDL	.400 <T	.	.
NOV	.600 <T	BDL	.	.
DEC	.600 <T	1.200	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
SPECIFIC PESTICIDES				
CARBARYL (NG/L)			DET'N LIMIT = 200.	GUIDELINE = 90000 (A1)
JUN	5400.000	2200.000	.	.
NOV	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
VOLATILES				
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)
MAY	BDL	.050 <T	.	.050 <T
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	.100 <T
SEP	BDL	.100 <T	.	.050 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	.100 <T	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)
MAY	BDL	BDL	.	BDL
JUN	BDL	.050 <T	.	.050 <T
JUL	BDL	.100 <T	.	.050 <T
AUG	BDL	.200 <T	.	.100 <T
SEP	BDL	BDL	.	.100 <T
OCT	BDL	.100 <T	.	.050 <T
NOV	BDL	.050 <T	.	.050 <T
DEC	.100 <T	.050 <T	.	.050 <T
M-XYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	.300 <T
SEP	BDL	BDL	.	.200 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	.150 <T
SEP	BDL	BDL	.	.150 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	.150 <T	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)
MAY	BDL	60.500	.	77.200	
JUN	BDL	81.200	.	61.000	
JUL	BDL	74.900	.	77.400	
AUG	BDL	69.100	.	92.600	
SEP	BDL	80.600	.	100.900	
OCT	BDL	82.000	.	89.900	
NOV	BDL	50.200	.	70.600	
DEC	BDL	47.600	.	61.900	
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)
MAY	BDL	19.750	.	23.750	
JUN	BDL	27.000	.	19.800	
JUL	BDL	21.400	.	22.000	
AUG	BDL	24.850	.	30.000	
SEP	BDL	22.150	.	23.800	
OCT	BDL	20.600	.	22.950	
NOV	BDL	13.850	.	16.300	
DEC	BDL	18.100	.	19.350	
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)
MAY	BDL	4.500	.	4.300	
JUN	BDL	6.400	.	5.500	
JUL	BDL	4.200	.	4.900	
AUG	BDL	7.000	.	7.700	
SEP	BDL	3.400	.	3.200	
OCT	BDL	3.200	.	3.900	
NOV	BDL	2.300	.	2.400	
DEC	BDL	3.600	.	4.200	
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)
MAY	BDL	BDL	.	BDL	
JUN	BDL	BDL	.	BDL	
JUL	BDL	.050 <T	.	BDL	
AUG	BDL	.100 <T	.	.100 <T	
SEP	BDL	BDL	.	BDL	
OCT	BDL	BDL	.	.050 <T	
NOV	BDL	BDL	.	BDL	
DEC	BDL	BDL	.	BDL	
BROMOFORM (UG/L)			DET'N LIMIT = 0.20		GUIDELINE = 350 (A1+)
MAY	BDL	BDL	.	BDL	
JUN	BDL	.200 <T	.	.200 <T	
JUL	BDL	BDL	.	.200 <T	
AUG	BDL	.400 <T	.	.400 <T	
SEP	BDL	BDL	.	BDL	
OCT	BDL	BDL	.	BDL	
NOV	BDL	BDL	.	BDL	
DEC	BDL	BDL	.	BDL	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TILBURY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)
MAY	BDL	74.950	.	105.200
JUN	BDL	114.900	.	86.600
JUL	BDL	100.500	.	104.550
AUG	BDL	101.300	.	130.700
SEP	BDL	106.050	.	127.900
OCT	BDL	105.800	.	116.750
NOV	BDL	66.400	.	89.300
DEC	BDL	69.300	.	85.400

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.